

## Contributors to this Issue

O. B. BLACKWELL, B.S. in electrical engineering, Massachusetts Institute of Technology. After graduation, he entered the Engineering Department of the American Telephone and Telegraph Company and in 1919 was made Transmission Development Engineer. Mr. Blackwell has general supervision of transmission developments and has been prominently associated with progress in long distance wire and radio telephony.

R. N. CONWELL. Mr. Conwell is Transmission and Substation Engineer, Public Service Electric and Gas Company, Newark, New Jersey.

LLOYD ESPENSCHIED. Mr. Espenschied is High Frequency Transmission Engineer, Department of Development and Research, American Telephone and Telegraph Company. He joined the Bell System in 1910, having graduated from Pratt Institute the previous year. He has taken an important part in practically all of the Bell System radio developments, beginning with the first long-distance radio-telephone tests of 1915, at which time he received the voice in Hawaii from Arlington, Va. He has participated in a number of international conferences on electric communications.

BANCROFT GHERARDI, B.Sc., Polytechnic Institute, Brooklyn, N. Y., 1891; M. E., Cornell University, 1893; M.M.E., Cornell University, 1894. New York Telephone Company, Engineering Assistant, 1895-99; Traffic Engineer, 1899-1900. New York and New Jersey Telephone Company, Chief Engineer, 1900-06. New York Telephone Company, and New York and New Jersey Telephone Company, Assistant Chief Engineer, 1906-07. American Telephone and Telegraph Company, Equipment Engineer, 1907-09; Engineer of Plant, 1909-18; Acting Chief Engineer, 1918-19; Chief Engineer, 1919-20; Vice President and Chief Engineer, 1920-. Mr. Gherardi is a Past President of the American Institute of Electrical Engineers and is now President of the American Standards Association.

WILLIAM H. HARRISON, Plant Engineer, American Telephone and Telegraph Company. Mr. Harrison entered the Bell System in 1909 as a repairman for the New York Telephone Company. In 1915 he became engaged in circuit design work with the Western Electric Com-

pany and in 1918 joined the staff of the American Telephone and Telegraph Company. He was made Equipment and Building Engineer in 1924, Acting Plant Engineer in 1928 and Plant Engineer in 1929.

H. L. HUBER, Cornell University, 1909-13; Chesapeake and Potomac Telephone Company and Associated Companies, 1913-17; Signal Corps, U. S. Army, 1917-19; Chesapeake and Potomac Telephone Company and Associated Companies, 1919-27; American Telephone and Telegraph Company, Department of Operation and Engineering, 1927-. Mr. Huber is now Engineer on Foreign Wire Relations.

HERBERT E. IVES, B.S., University of Pennsylvania, 1905; Ph.D., Johns Hopkins, 1908; assistant and assistant physicist, Bureau of Standards, 1908-09; physicist, Nela Research Laboratory, Cleveland, 1909-12; physicist, United Gas Improvement Company, Philadelphia, 1912-18; U. S. Army Air Service, 1918-19; Western Electric Company and Bell Telephone Laboratories, 1919 to date. As Director of Electro-Optical Research, Dr. Ives has to do principally with the production, measurement and utilization of light in communication problems.

J. C. MARTIN. Mr. Martin is associated with the Middle West Utilities Company, Chicago, Illinois.

EDWARD C. MOLINA, Engineering Department of the American Telephone and Telegraph Company, 1901-19, as engineering assistant; transferred to the Circuits Design Department to work on machine switching systems, 1905; Department of Development and Research, 1919-. Mr. Molina has made contributions to the theory of probability and its applications to telephone problems, such as the efficiency of various trunking arrangements and the significance of data derived from samples. He has also taken out several important patents relating to machine switching.

R. F. PACK. Mr. Pack is Vice President and General Manager, Northern States Power Company, Minneapolis, Minnesota.

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H. S. WARREN, A.B., Stanford University, 1898. American Bell Telephone Company 1899-1903; American Telephone and Telegraph Company, 1902-. Department of Development and Research, 1919 to date; now Protection Development Engineer. Mr. Warren's work has been chiefly of a development character in the field of transmission, equipment, and electrical interference.

H. L. WILLS. Mr. Wills is Assistant to Vice President and General Manager, Georgia Power Company, Atlanta, Georgia.

WILLIAM WILSON, Victoria University of Manchester, 1904-10; B.Sc., 1907; M.Sc., 1908; Cavendish Laboratory, Cambridge University, 1910-12, B.A., 1912; Lecturer in Physics, Toronto University, 1912-14; D.Sc. Manchester, 1913. Engineering Department, Western Electric Company, 1914-24; 1925- Bell Telephone Laboratories; Assistant Director of Research 1928-. Dr. Wilson has published numerous papers on radioactivity and thermionics and since 1917 has been in direct charge of vacuum tube development and design and since 1925 has also been in charge of radio development.

O. J. ZOBEL, A.B., Ripon College, 1909; A.M., Wisconsin, 1910; Ph.D., 1914; instructor in physics, 1910-15; instructor in physics, Minnesota, 1915-16; Engineering Department, American Telephone and Telegraph Company, 1916-19; Department of Development and Research, 1919-. Mr. Zobel has made important contributions to electric circuit theory, which includes the subject of distortion correction as well as that of wave-filters.